REMARKS

This amendment is responsive to the Office Action dated April 29, 2005. Applicant has cancelled claims 19 and 25. In addition, Applicant has amended claims 1, 13, 14, 18, 20, 21, 22, 23, 27, 31 and 39. Claims 1, 4-18, 20-24 and 26-44 are pending upon entry of this amendment.

Claim Objections

In the Office Action, the Examiner objected to claims 1, 13, 18 and 39 for certain informalities. Applicant has amended the claims for purposes unrelated to patentability as requested by the Examiner.

Claim Rejection Under 35 U.S.C. § 102

In the Office Action, the Examiner rejected claims 1, 5, 9, 27, 31-33 and 37-38 under 35 U.S.C. 102(e) as being anticipated by Cain (USPN 6,697,325). Applicant respectfully traverses the rejection. Cain fails to disclose each and every feature of the claimed invention, as required by 35 U.S.C. 102(e), and provides no teaching that would have suggested the desirability of modification to include such features.

Before addressing the specific claim rejections, Applicant provides some preliminary comments to clarify certain technical differences between the cited references and Applicant's claimed invention.

In general, routing devices use different types of protocols to communicate with other routing devices and ultimately make routing decisions. One common class of routing protocols is path vector routing protocols (also referred to as distance-vector routing protocols) that are used to communicate available routes within a network. In particular, path vector routing protocols exchange advertisement messages to announce new routes and withdraw routes. Each route defines an available path (i.e., a vector) through the network, such as {A→B→C→D→E→F}, where A-F are different locations within the network. Routers that implement a path vector routing protocol exchange large sets of available routes, and withdraw particular routes when the routes are no longer available. Based on this information, the routing devices select paths through the network for forwarding traffic. Common path vector routing protocols include the

Border Gateway Protocol (BGP), the Routing Information Protocol (RIP), the Internet Gateway Routing Protocol (IGRP) and the Routing Table Maintenance Protocol (RTMP).[1]

In contrast, some routing protocols do not exchange routes but instead exchange information describing the status of individual links (i.e., the physical communication connections between the nodes). This type of protocol is commonly referred to as a "link state protocol." Instead of communicating routes through networks, information is conveyed that describes the connectivity status of each particular link, i.e., whether the link itself is available. Link-state routers gather information about particular links and pass on the link state information to neighbors. Eventually, a link-state router has information about all links within a network, and then runs the Dijkstra shortest path algorithm to calculate the best path to each network. The most common link-state routing protocol is the Open Shortest Path First (OSPF) protocol. Other link-state routing protocols includes the Intermediate System to Intermediate System (IS-IS) protocol, the OSI protocol, and the NetWare Link Services Protocol (NLSP).[2]

In one sense, Applicant's claimed invention can be viewed as a hybrid routing protocol in which a path vectoring routing protocol that advertises <u>routes</u> has been extended to include specific <u>link</u> failure information in certain situations. For example, when a link fails, the routing protocol advertises <u>routes</u> to be withdrawn but also includes link failure information that describes the particular link that has failed. In this manner, the technique can be viewed as bridging a gap between path vector routing protocols and link state protocols known in the art.

Claims 1, 5 and 9

Applicant's claim 1 requires generating link failure information identifying a failed link within a computer network, and communicating an update message to routers within the computer network in accordance with a routing protocol. Amended claim 1 requires that the update message request <u>specifies routes</u> through the computer network that rely upon the failed link and <u>request withdrawal of the routes specified in the update message</u>, and that update message further incorporates the <u>link failure information</u> to identify the failed link.

[1] Sheldon, Encyclopedia of Networking & Telecommunications, McGraw-Hill, pg 741.
[2] Id.

Thus, claim 1 requires both that the update message specify routes to be withdrawn as well as the link failure information that identifies the failed link.

In contrast, Cain describes use of a conventional link state protocol and specifically refers to OSPF and IS-IS. As explained above, OSPF and IS-IS referred to by Cain on col. 1, lines 20-25 and cited by the Examiner are very well known link state protocols. As described by Cain, these conventional link state protocols send link state advertisements (LSAs) to communicate state information for particular links. However, it is well known that link state routing protocols do not describe actual routes (i.e., vectors) through a network, as do path vector routing protocols.

For example, col. 2, lines 50-57 and col. 5, lines 21-25 of Cain, as cited by the Examiner, describe a conventional "LSA protocol message" that indicates link failure. Cain makes clear that the receiving node removes the "failed communication link" from its topology database. In this fashion, Cain is describing conventional a link state protocol that communicate link information, not actual routes, as do path vectoring routing protocols.

For at least these reasons, Cain does not teach or suggest a protocol in which an update message has been extended to specify both: (1) one or more routes to be withdrawn, and (2) link failure information that identifies a fail link. This hybrid approach is not taught or suggested by Cain.

With respect to claim 5, the portion of Cain cited by the Examiner describes the node automatically deleting the link status information from a cache after a predetermined period of time. In contrast, Applicant's claim 5 requires that the link failure information included within the update message itself specify a time period for using the link failure information. Cain does not teach or suggest a routing protocol in which an update message between routers specifies a time period for using link failure information, as required by claim 5.

In order to support an anticipation rejection under 35 U.S.C. 102(e), it is well established that a prior art reference must disclose each and every element of a claim. This well known rule

of law is commonly referred to as the "all-elements rule."[3] If a prior art reference fails to disclose any element of a claim, then rejection under 35 U.S.C. 102(e) is improper.[4]

Cain fails to disclose each and every limitation set forth in claims 1, 5 and 9. For at least these reasons, the Examiner has failed to establish a prima facie case for anticipation of Applicant's claims 1, 5 and 9 under 35 U.S.C. 102(e). Withdrawal of this rejection is requested.

Claim 27, 31-33 and 37-38

Applicant has amended claim 27 to include subject matter that the Examiner indicated as allowable. In particular, Applicant has amended claim 27 to require that the control unit forward the packets as if the failed link has been restored upon expiration of a valid time period associated with the link failure information. For at least these reasons, claims 27-38 are in a condition for allowance.

<u>Claim Rejection Under 35 U.S.C. § 103</u>

In the Office Action, the Examiner rejected claims 4, 7-8, 10-13, 15, 18, 21-26, 30 and 39-43 under 35 U.S.C. 103(a) as being unpatentable over Cain in view of Agarwal et al. (USPN 6,760,777). In addition, the Examiner rejected claims 16-17 and 34-36 under 35 U.S.C. 103(a) as being unpatentable over Cain in view of Agarwal et al. and in further view of Hardjono (USPN 6,425,004).

Applicant respectfully traverses the rejection. The applied references fail to disclose or suggest the inventions defined by Applicant's claims, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed invention.

Claims 4, 7-8, 10-11, 23 and 26

With respect to claim 4, 7-8, 10-11, 23 and 26, the Examiner correctly acknowledges that Cain fails to describe the Border Gateway Protocol (BGP) or a path vector routing protocol of

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[3] *See Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 USPQ 81 (CAFC 1986) ("it is axiomatic that for prior art to anticipate under 102 it has to meet every element of the claimed invention").
[4] *Id. See also Lewmar Marine, Inc. v. Barient, Inc.* 827 F.2d 744, 3 USPQ2d 1766 (CAFC 1987); *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (CAFC 1990); *C.R. Bard, Inc. v. MP Systems, Inc.*, 157 F.3d 1340, 48 USPQ2d 1225 (CAFC 1998); *Oney v. Ratliff*, 182 F.3d 893, 51 USPQ2d 1697 (CAFC 1999); *Apple Computer, Inc. v. Articulate Systems, Inc.*, 234 F.3d 14, 57 USPQ2d 1057 (CAFC 2000).

any type. However, the Examiner asserts that BGP and path vectoring routing protocols are known and relies on Agarwal solely for this premise.

Applicant agrees that BGP and path vectoring routing protocols are commonly used. However, as described above in more detail, and in Agarwal, routers use path vectoring routing protocols to advertise and withdraw routes (i.e., vectors of nodes) through networks. Other routers use link state protocols to convey state information for particular links. Agarwal makes clear that the described protocol specifies routes to be withdrawn (see, e.g., "rdBGP includes a procedure for propagation of multiple routes ... rdBGP includes a procedure for explicit route withdrawal based on route path attributes" at col. 7, ll.1-10).

Thus, neither Agarwal nor Cain, either in combination or singularly, teach or suggest the use of BGP or any path vector protocol in which an update message has been extended to specify both: (1) one or more routes to be withdrawn, and (2) link failure information that identifies a fail link, as claimed by the Applicant. One of ordinary skill in the art would not look to BGP or a path vectoring protocol to convey link failure information as based on the teachings of Cain and Agarwal, as suggested by the Examiner. To the contrary, Cain and Agarwal merely describe known and commonly used link state protocols and path vectoring protocols, respectively. Neither Cain nor Agarwal, either singularly or in combination, suggest the hybrid protocol claimed by the Applicant that, at certain times, can be used to specify both routes to be withdrawn and related link failure information in order to reduce network flaps.

For at least these reasons, the Examiner has failed to establish a prima facie case for non-patentability of Applicant's claims 4, 7-8, 10-11, 23 and 26 under 35 U.S.C. 103(a). Withdrawal of this rejection is requested.

Claim 13

Regarding claim 13, the Examiner cites col. 2 of Cain that describes a node automatically starting a timer upon receiving a first LSA protocol message and updating its topology database if the node receives additional LSA protocol messages while the timer is running. Cain makes no mention of the timeout period other than it is "predefined."

In contrast, Applicant's claim 13 requires that the link failure information included within the update message itself specify a valid time period for using the link failure information. Cain

does not teach or suggest a routing protocol in which an update message exchanged between routers specifies a time period for using link failure information, as required by claim 13.

Claim 39

In rejecting claim 39, the Examiner relies on portions of Cain that describes a node automatically starting a timer upon receiving a first LSA protocol message and updating its topology database if the node receives additional LSA protocol messages while the timer is running. For example, the Examiner refers to the "timer" and cols. 4 and 5 of Cain.

Applicant's claim 39, however, specifically requires receiving a message including link failure information that identifies a failed link as well as a storage time period for which the link failure information is to be stored by a receiving router. Thus, claim 39 specifically requires that the link failure information communicated by the message specify both the failed link and the storage time associated with the link failure information. Cain does not teach or suggest a routing protocol that can be used to convey time periods for using link failure information for specific failed links, as required by claim 39.

Claim 40-43

The Examiner appears to have overlooked certain requirements of Applicant's claims 40-43. For example, claim 40 requires receiving a second message with the link failure message identifying the failed link; and forwarding the second message only if the storage time period for the link failure message has expired. Claim 42 requires forwarding a message containing link failure information only when the link failure information has not been previously received.

The cited portion of Cain describes route computation (i.e., route selection) by a node and is does not refer at all to whether messages containing link failure information are forwarded. For example, the cited portion states:

> When node C 112 receives a subsequent LSA protocol message relating to the failure of the communication link 104, from node B 106, node C 112 discards the LSA protocol message without computing new routes. … Having already removed the communication link 104 from the list of communication links associated with node B 106 and computed new routes, node C 112 simply discards the subsequent LSA protocol message from node B 106.

This portion of Cain cited by the Examiner is clearly referring to route selection and is silent as to forwarding of link failure information based upon a storage time.

Furthermore, claim 43 requires receiving a message including link failure information identifying a failed link and at least one route having at least three nodes including a source node, a destination node and at least one intermediate nodes, wherein the failed link comprises a link coupling two of the nodes along the route. As stated above, link state protocols described by Cain do not specify routes. The Examiner concludes that it would have been obvious to the person of ordinary skill in the art "to provide the identifies [sic] with source node, destination node and intermediate node into the Cain's topology database." The Examiner overlooks Applicant's requirements that routing protocol message itself specify both: (1) link failure information identifying a failed link. and (2) at least one route having at least three nodes including a source node, a destination node and at least one intermediate nodes, wherein the failed link comprises a link coupling two of the nodes along the route. Such a routing protocol is not taught or suggested by Cain or the other references, either singularly or in combination.

For at least these reasons, the Examiner has failed to establish a prima facie case for non-patentability of Applicant's claims 40-43 under 35 U.S.C. 103(a). Withdrawal of this rejection is requested.

Claims 16-17 and 34-36

Claims 16-17 and 34-36 are allowable for at least the reasons set forth above with respect to the base claims on which they depend. Moreover, the applied references fail to disclose or suggest authenticating link failure information, as required by claim 16. Further, the applied references fail to disclose link failure information communicated in accordance with a routing protocol and that includes security data for authenticating an originator of the link failure information, as required by claim 32.

Hardjono appears to describe authentication a source of a packet generally, but makes no mention of authenticating a source of link failure information or the inclusion of security data within a link failure message. For at least these reasons, the Examiner has failed to establish a prima facie case for non-patentability of Applicant's claims 16-17 and 34-36 under 35 U.S.C. 103(a). Withdrawal of this rejection is requested.

Claims 18, 20 – 22.

In the Office Action, the Examiner objected to claim 19 as being dependent upon a rejected base claim, but indicated that claim 19 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant has amended claim 18 to include the subject matter of claim 19 and cancelled claim 19. For at least these reasons, claims 18, 20-22 are in a condition for allowance.

Claims 23-26

Applicant has canceled claim 25 and amended claim 23 to include subject matter that the Examiner indicated as allowable. In particular, Applicant has amended claim 23 to require forwarding a data packet to neighboring routers within the computer network according to the link failure information and a path vector routing protocol prior to expiration of the time period, and forwarding packets as if a failed link has been restored upon expiration of a time period. For at least these reasons, claims 23, 24 and 26 are in a condition for allowance.

CONCLUSION

All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

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By: Kent J. Sieffert

SHUMAKER & SIEFFERT, P.A.
8425 Seasons Parkway, Suite 105
St. Paul, Minnesota 55125
Telephone: 651.735.1100
Facsimile: 651.735.1102

Name: Kent J. Sieffert
Reg. No.: 41,312